Whitepine

Botany Report

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for:

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Nez Perce – Clearwater National Forest

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Introduction

Past management and fire exclusion has resulted in a forest that is composed of seral species forming dense fuels. These forests support increased insect activity and disease which further contributes to fuel loading and increased fire susceptibility. Among other things, this project will implement vegetative management to remove heavy fuels and move stand condition toward a more natural composition to improve species diversity and balance vegetative successional stages across the landscape to create stand conditions that meet Forest Plan goals, objectives, and standards by maintaining ecosystem health and productivity.

Fulfilling these goals would contribute to the overall botanical diversity and maintenance of native plant communities and return ecological conditions closer to their natural range. Floral diversity is dependent upon both early and late seral communities in the project area. Seral plant species requiring some form of disturbance would be benefited from satisfying the purpose and need of this project. However, the potential effects of proposed activities to species and habitats may be both detrimental and beneficial. This document provides an analysis of rare species potentially present and the effects proposed activities may have on them. Specific activities included in the analysis are vegetation management, prescribed fire, road construction and any contributing cumulative effects. For the purpose of this analysis, rare plant species include threatened, and sensitive species of concern.

Overview of Issues Addressed

The effect on on existing occurrences and potentially suitable habitat, measured in acres, are the indicators used in the analysis.

Affected Environment

Existing Condition

The project area is dominated by late seral species due to past fire exclusion. Seral species such as Ponderosa pine and larch are present, but reduced from historic levels. Overall forest vegetation is dense and simplified compared to historic conditions. Botanically the lands in the project are simplified compared to past conditions that were shaped by disturbance to be more diverse and complex. Habitat for late seral species has increased, while species with an affinity for more open conditions have likely declined with the progression of succession. In the non-forest habitats weeds have simplified the plant communities over time.

Two species of concern are known to occur in the project area, but potentially suitable habitat for several others is present. Given the extensive area of suitable habitat for some of the species of concern, it is anticipated that additional undocumented populations may occur.

Federally Listed Species

Through a species list generated on March 12, 2019 (Consultation Code: 01EIFW00-2019-SLI-0807), the threatened plant species, water howellia (*Howellia aquatilis*), will be included in this analysis as directed by the U.S. Fish and Wildlife Service (USFWS). Other threatened species traditionally included in project analysis on the Nez Perce – Clearwater National Forest include Macfarlane's four-o'clock (*Mirabilis macfarlanei*) and Spalding's catchfly (*Silene spaldingii*), will not be analyzed. Whitebark pine (*Pinus albicaulis*) is currently considered a Candidate for

federal listing by the USFWS. Due to lack of required high elevations it does not occur in the project area and will not be further addressed in this report.

Water Howellia (*Howellia aquatilis*)

Water howellia was proposed for listing as a threatened species in 1993 (USFWS 1993) and was listed as a threatened species in 1994 (USFWS 1994). No critical habitat has been designated for this species. A draft recovery plan has been prepared (Shelly and Gamon 1996). The most recent range-wide status assessment of water howellia was reported by Mincemoyer (2005).

Water howellia is an aquatic annual plant, reproducing entirely by seed. The plant is predominantly a winter annual with germination taking place in the fall and seedlings over-wintering and resuming growth in the spring. Emergent flowers bloom soon after the stems reach the water surface and are present from June into August. Seed dispersal starts in June from submerged flowers and extends until late summer from emergent flowers (Shelly and Gamon 1996).

The most common habitat for *Howellia aquatilis* is small, vernal, freshwater wetlands, ponds and oxbows in broad valleys that have an annual cycle of filling with water and drying up late in the season. Generally vegetation is a mosaic of riparian shrubland and meadows with inclusions of mature conifers. Water howellia does not occur in the project area, but the two Idaho locations are found about two miles south of the project area and about five miles to the northwest.

Sensitive Species

Two sensitive plant species are known to occur in the project area, while suitable habitat exists for an additional eight others as indicated in Table 1, which summarizes potential habitat in the project area. Acres values are based upon modeling of potentially suitable habitat. Some models give a very close approximation of habitat present, while others are more general and may include some area that is not presently suitable due to current seral stage. Sensitive species not included in the table are not suspected to occur in the project area due to suitable habitat not being present based upon existing information or the species local range does not include the project area.

Table 1. Potential Sensitive Plants within the Project Area

Common and Latin Name	Presence	Habitat/Community Type	Potential Habitat (acres)
Deerfern *Blechnum spicant*	Yes	Shaded understory of mid to late-seral western redcedar. Often associated with riparian areas.	848
Crenulate moonwort *Botrychium crenulatum*	Potential	Shaded moist sites, generally under mature western redcedar, but occasionally other conifers or meadows.	679
Lance-leaf moonwort *Botrychium lanceolatum* var. *lanceolatum*	Potential	Shaded moist sites, generally under mature western redcedar, but occasionally other conifers or meadows.	679
Mingan moonwort *Botrychium minganense*	Potential	Shaded moist sites, generally under mature western redcedar, but occasionally other conifers or meadows.	679
Mountain moonwort *Botrychium montanum*	Potential	Shaded, moist sites, generally under mature western redcedar.	679

Common and Latin Name	Presence	Habitat/Community Type	Potential Habitat (acres)
Northern moonwort *Botrychium pinnatum*	Potential	Dry to moist meadows and transitional habitats. Sometimes shaded, moist sites under various conifers.	681
Least moonwort *Botrychium simplex*	Potential	Dry to moist meadows and transitional habitats. Sometimes shaded, moist sites under various conifers.	681
Green bug-on-a-stick *Buxbaumia viridis*	Potential	On large decaying logs or ash soils in moist, late successional grand fir or western redcedar forests. Some affinity for shaded riparian areas.	5,860
Clustered lady's-slipper *Cypripedium fasciculatum*	Yes	Partial to low shade of warm forests in a mid-late successional stage. Mostly in western redcedar, but also in grand fir, Douglas fir and western hemlock forests.	1,249
Naked Rhizomnium *Rhizomnium nudum*	Potential	Moist substrates at low to moderate elevation in humid, mesic forests. Often riparian.	5,298

Deerfern (*Blechnum spicant*)
Deerfern is an evergreen, coastal disjunct fern that usually grows in western red cedar and sometimes riparian areas of other moist forests, where it prefers nutrient rich, decomposing soils. There are eight small populations grouped as three occurrences in three basins within the project area. All populations are of a single genet, with two containing six approximate ramets. Modeling of suitable forest habitats and riparian areas that have a higher affinity for occurrence reveals approximately 848 acres of potential habitat. A broader model of the potential habitat that also includes general upslope forest types that sometimes are occupied indicates 5,272 acres of habitat; however such upslope individuals are often very small and unsuccessful and its not know if they persist long in such habitats.

Crenulate moonwort (*Botrychium crenulatum*), Lance-leaf moonwort (*Botrychium lanceolatum*), Mingan moonwort (*B. minganense*), Mountain moonwort (*B. montanum*), Northern moonwort (*B. pinnatum*), Least moonwort (*B. simplex*)
Little is known about the moonworts on the Nez Perce - Clearwater National Forest and no occurrences are known from the Meadow Creek basin. Throughout the west, general habitat for moonworts varies widely from dry meadows, grass/forb openings, lodgepole pine and Englemann spruce to dry grand fir. In northern Idaho, most moonworts are associated with riparian areas and moist sites under old western red cedar (Mousseaux 1996). Least moonwort and occasionally others can occupy edge habitats and meadows, but such occurrences have not been found on the Palouse Ranger District.

All Botrychium species are believed to be obligately dependent on mycorrhizal relationships. The subterranean generation depends on fungus for nutrients, while the roots of the above ground generation lack root hairs and probably depend on the fungus for absorption of water and minerals (Chadde and Kudray 2001). Little is known about the mycorrhizal fungi associated with Botrychium species other than their presence with the two generations. The mycotrophic condition is important to the ecology of Botrychium species in several ways. Nutrition supplied through a fungal symbiont may allow the ferns to withstand repeated herbivory, prolonged dormancy, or growth in dense shade (Kelly 1994, Montgomery 1990). The fungal/fern

relationship has implications for the occurrence of genus communities, the distribution of the species across the landscape, and associations with particular vascular moonworts and strawberries (Wagner, 1999). Moonworts may exist underground for many years before an above ground plant develops.

None of these moonwort species are known to occur in the project area. The variable habitats and mycorrhizal associations make predictions on suitable habitat extremely difficult. Suitable habitat in the project is provided by old growth mesic forests, primarily western red cedar. Modeling of these habitats revealed 692 acres that are potentially suitable. Most of this habitat formerly designated as old growth or is associated with larger riparian areas. Potentially suitable meadow habitat may not occur in the project area, but would be limited to less than two additional acres associated with larger riparian areas.

Green-bug-on-a-stick (*Buxbaumia viridis*)
This moss is found across the Pacific Northwest and Northern Rockies, but is considered relatively rare to uncommon across its range. In north central Idaho it is found at widely scattered locations on moist sites under mid-to-late seral conifer forests. Substrate availability and distribution and shade (humidity levels) are important habitat elements (Laaka 1992). Occurrences are predominately under a closed canopy on large logs in advanced stages of decay. Relatively moist, potentially suitable forest habitats occur in most of the project area and cover approximately 5,860 acres on Forest Service lands. Though it may occur in microsites of suitable conditions anywhere in the moist forest, the large majority of desirable habitat would be along forested riparian areas and in mesic old growth forest that provide the necessary logs. This species is often overlooked due to its small size and inconspicuous nature, but with an abundance of suitable habitat, occurrences are expected.

Clustered lady's-slipper (*Cypripedium fasciculatum*)
This orchid is widespread in the western United States where it grows in a variety of forest habitat types. In north central Idaho, most occurrences are in warm, moist sites in mid-to-late seral conifer communities of a western red cedar habitat type, but a significant number of populations are in Douglas-fir and grand fir habitats. A large occurrence with several populations occurs in the western redcedar and western hemlock forests of the project area. This occurrence is noteworthy because it is the largest occurrence of the species in Idaho and possibly the largest on lands administered by the Northern Region of the Forest Service.

Rangewide, no unique habitat parameter is known that allows biologists to predict future occurrences with more than a very general specificity (Greenlee 1997). However, due to the project area being subject to many past management activities and frequent surveys of the well documented occurrence of this species having occurred, the particular occupied habitat in this project area are well understood. Closed, mid to late seral forests of the aforementioned forest types that occupy lower, relatively warm elevations and slopes above the main stream bottoms support this species in the project area. The species does not grow in areas that have undergone even aged management or have been cleared by natural events. Modeling of the known habitat parameters indicate there are approximately 1,249 acres of suitable habitat in the project area at this time. The amount of potential habitat generally does not translate into species abundance for this species, however. Limitations in the species biology and ecology result in this orchid being very rare throughout its range.

Naked rhizomnium (*Rhizomnium nudum*)
In North America this moss is found in the Pacific Northwest and is considered rare in the Columbia River basin. General habitat can be described as cool and oceanic (Koponen 1973). It

grows in boreal and temperate forest on soil, humus, or rotten logs, often along streams or in damp depressions, and occasionally among boulders or talus at cliff bases, within conifer forest, from near sea level to subalpine zones (Christy and Wagner 1996, Gray 1999). Most inland populations are riparian, but it occasionally is found on moist slopes well above the streams. Idaho locations are usually in western red cedar. It has not been found in the project area, however suitable habitats occurs in lower elevations of moist forest types and riparian areas. Such areas comprise 5,298 acres of Forest Service ground in the project area.

Desired Condition

The forest plan states that no action will be taken that will jeopardize a threatened and/or endangered species. Management of sensitive species is to ensure population viability throughout their range on National Forest lands and to ensure they do not become federally listed as threatened or endangered. The forest plan supports this direction but does not set specific standards and guides for sensitive plants. The proposed actions are consistent with this direction to the extent that proposed management actions would not adversely affect viability of existing sensitive plant populations or habitat.

Threatened and endangered species are designated under the Endangered Species Act. It is the policy of Congress that all Federal departments shall seek to conserve endangered and threatened species and shall utilize their authorities in furtherance of this purpose (ESA 1531.2b). According to U.S. Fish and Wildlife Service list dated March 12, 2019, only water howellia needs addressed in this analysis as described under the Federally Listed Species section of the Existing Condition.

Sensitive species are defined in the Forest Service Manual (FSM 2670.5) as “those plant and animal species identified by the Regional Forester for which population viability is a concern, as evidenced by significant current or predicted downward trends in population numbers, density, or habitat capability that reduce a species/existing distribution.” In FSM 2670.22, management direction for sensitive species is in part, to ensure that species do not become threatened or endangered, because of Forest Service actions and to maintain viable populations of all native species. The most recent update to the sensitive species list has been effective since May 2011. The Forest Service must evaluate impacts to sensitive species through a biological evaluation.

This specialist report contains the necessary determinations section and discussion of effects for sensitive plant species to serve as the Biological Evaluation for rare plants as directed by the streamlined BE processes outlined in the FSM. This report also discloses and documents the potential effects to water howellia in the project areas as directed by the USFWS, thus this report also serves as the Biological Assessment for this project.

Following legal and policy direction will maintain viability of rare plant elements while implementing management activities that will restore a balance of successional stages, increasing general vegetative diversity and resiliency from the time of implementation into the future.

Environmental Consequences

Methodology

Analysis included study of aerial photos and topographic and forest habitat maps to identify potential habitat for plants of concern and to direct field surveys. Individual species requirements were reviewed and appropriate modeling criteria selected to determine which species or corresponding habitat would be expected to occur in the project area.

The basic mapping unit used is the Habitat Type Group (HTG). This classification groups similar forest habitats into functional categories based upon vegetative type, moisture and temperature characteristics. For some species, these units are useful to match species criteria to potential habitat. For other species, the Habitat Type Group itself may not be a good indicator of suitable habitat, but may provide the microsites the species requires. Other species may have more specific habitat parameters that enable more precise modeling than the HTG.

Using GIS, the habitat units important to sensitive plants were identified and mapped for the project area. Locations of the proposed activities were evaluated against the habitat groupings to determine which activities would occur in those habitats. Each activity occurring in potential habitat was evaluated based on the criteria important for each species. Forest personnel have surveyed large portions of the project area for the presence of sensitive plant species and determination of suitable habitats.

Based on the results of research, field work and GIS analysis; direct and indirect effects are discussed for each species. Direct effects could result from vegetation management, prescribed burns, and road construction. Indirect effects for some species may include the expansion of weeds and the mitigating treatments of these infestations or changes to the forest canopy that may affect light and temperature regimes. Cumulative effects are the overall effects to species from past, present and reasonably foreseeable future projects. Historically such effects on individual species were not measured or noted. However, the past effects on general habitat condition can be qualified and matched to species dependent on a particular habitat.

Incomplete and Unavailable Information

Parameters used to model potentially suitable habitat can vary greatly from species to species. Some species have a high affinity for ecological factors and features that are easily defined and obtainable from various data bases and information sources. These models are believed to provide a good approximation of the habitat on the ground. Other species are very general in occurrence and are not tied to clearly definable habitat characteristics. In such a case only very general modeling is possible. For these species a broad, conservative approach is taken to increase the likelihood that potential habitat is included in the analysis.

Spatial and Temporal Context for Effects Analysis

The spatial boundary for analyzing the direct and indirect effects to rare plants is the project area. This area is selected because the effects are site specific to areas treated within the project area and will not extend beyond the boundaries, and effects from outside the defined area will likewise not affect the resource within.

Temporally, these effects are considered only for the species potentially affected by this project from the initial habitat transformations in the early 1900s through the proposed and reasonably foreseeable future. This is because that is the approximate age of forest suitable for some late-seral species of concern to begin recolonization of managed forests. Thus the effects of past forest activities from that time are manifest approximately to the present time. An general accounting of these past activities is provided in the cumulative effects discussion.

The spatial boundaries and reasons for analyzing the cumulative effects are the same as for direct/indirect effects.

The temporal boundaries and reasons for analyzing the cumulative effects are the same as for direct/indirect effects.

Past, Present, and Foreseeable Activities Relevant to Cumulative Effects Analysis

Discussion of cumulative effects for rare plants is addressed through the general trend of the suitable habitat required by these species as a result of past, present and future management actions. It generally is not possible to directly quantify effects of specific activities that are several years or decades old on species of concern today. The status and occurrence of rare plants was completely unknown for much of the management history of the watershed. Historically the changes in condition and abundance of specific habitats important to these species are also largely unknown. Therefore the effects of these past projects can only be qualified through general discussions. However, the results of past projects contribute to the current condition, which can be used to discuss and quantify effects of proposed activities on rare plant species.

Because all of these species occur predominantly in the moist western red cedar habitats that are so dominant in the project area, discussion of effects to that forest type thorugh time can serve as proxy for this analysis.

The primary management activities that have influenced rare plant habitat in the Whitepine project area and continue to under this project include past and present timber harvest, and road construction. Timber harvest primarily began in the 1980s in the project area when a total of 596 acres of even aged management and 131 acres of uneven aged management occurred. In the 1990s 45 acres of even agec management and 926 acres of uneven aged management took place. Finally in the 2000s, 488 acres of even aged harvest and 473 acres of uneven aged management took place. Little management has taken place in the recent decade. Thus recent trends of harvest activity have been downward with a corresponding decline in effects to late seral, mesic forest habitat. In addition, advancement in harvest operations and logging technology would further reduced resource impacts.

Road construction activity generally mirrors harvest activity as the roads were primarily constructed to provide access to timber. Most of the current road work in the project area consists of routine maintenance and repairs, though short segments of new temporary roads and some new system road associated with the project will occur. As shown in the effects table, the addition of new roads will have a small effect on rare plant habitat. While this project will contribute to an increase in road activity, the trend throughout the management history of the project area through time has declined dramatically and will continues to decline overall.

Wildfire has occurred irregularly as far back as records have been kept. Records indicate that only small, uncommon wildfires have occurred going back several decades. This is probably due in part to easy access and suppression policies. There have been many small fires over this time period that likely have not been recorded and had little effect on the landscape. With increased fire suppression such disturbances generally have been in decline, but changes in wildfire management and fuel build up after decades of suppression contribute to increased fire likelihood into the future. The general habitat trend for late successional plant species would have increased due to succession during times of suppression, but anticipated trends may contribute to some reduction in late-seral vegetation should future fires burn with more intensity due to increased fuels. Habitat for rare plant species continues to expand due to species preference for more closed, older habitats.

Other activities such as livestock grazing affected habitat for some species in the past, but no longer occurs, thus they do not contribute to cumulative effects at this time. Noxious weed treatment potentially occurs within the project area, but this activity virtually never occurs in the

habitats of the species potentially affected in this project. Some activities such as trail maintenance, road maintenance, recreation site maintenance, access management, forest inventory and others are considered routine and ongoing and collectively would have negligible impacts on species or habitats of concern.

Alternative 1 – No Action

Direct and Indirect Effects

Since there are no management activities proposed under this alternative, there would be no direct effects on plant species or habitats.

Indirect effects that may change stand structure would be expected through time, some of which could alter habitats that are suitable for some sensitive plant species. In some cover types, forest openings may occur as seral species decline. In more mesic and mixed-conifer forest types, succession would continue to progress, resulting in a decline in size and frequency of small openings and forest gaps. In general, species requiring later seral forests would see an improvement in habitat quality and species with poor dispersal mechanisms would have an increased opportunity for establishment. Species requiring more open conditions would likely decline baring the absence of significant fire or other forest clearing event such as severe wind or disease. The increased severity of wildfire is possible due to the increased fuel build up in areas of past fire exclusion. Such an event would favor early seral species, while reducing or eliminating habitat for late seral species. Sensitive plant species that may occur in this project area would generally see an increase in suitable habitats as the forests get older with the progression of succession. However, forest clearing events that could be intensified through fuel build up could reduce such potential habitats.

Cumulative Effects

The no action alternative would produce no additional effects on potential rare plant habitat as compared to past activity levels. The progression of forest succession would improve habitat for most sensitive plant species. However, forest decline due to insect-caused mortality may cause localized openings and increases in light and fuel loads, which could lead to more intense wildfires and resource damage. In such cases older habitat favored by these species could see localized declines, but the trend overall would be one of increasing habitat suitability, baring a major wildfire or other natural clearing event.

Alternative 2 – Proposed Action

Design Features and Mitigation Measures

Clustered lady's-slipper occurs in some units proposed for treatement in this project. While some plants may be affected by management activities, protective measure will be included to protect occurrences of the species that are important to the viability of the overall population. Specific actions may involve avoidance, adjustments in unit boundaries or systems, and other measures determined in planning or layout as being necessary and effective. Similar efforts were implemented as part of the last project in this area and surveys revealed those efforts were successful in maintaining a healthy population.

Direct and Indirect Effects

Rare plant species can be affected by proposed management activities in a number of ways depending upon the nature, severity and timing of the disturbance and the individual species biology and ecology. The effects analysis is based on evaluation of the proposed management activities occurring in potentially suitable habitat and the potential for those activities to directly or indirectly effect plant populations or habitat characteristics. Discussion of the potential effects to federally listed and sensitive plant species follows a brief summary of the general effects of project activities. Quantitative effects on sensitive plant species habitat by the management activities of this project are summarized in Table 2.

The primary management activity that may affect species or habitats of concern would be timber harvest, particularly the regeneration harvests that subject the habitat to more direct mechanical disturbance and indirect alteration of the light, temperature and moisture regimes that determine distribution for most plants. Early seral species may benefit from such changes, but later seral species would decline or be extirpated. The implementation of intermediate harvest such as commercial thinning has some potential for direct mechanical harm during implementation, but generally the overall habitat conditions likely would not change enough to harm most late seral species. Much of the preferred habitats utilized by later seral species are generally associated with riparian areas that are excluded from proposed units or protected by application of PACFISH riparian buffers (see Aquatics report).

Prescribed fire is generally implemented under moderated conditions that allow fuels to be treated without displacing large areas of forests. While direct effects to plants on the ground can be significant at implementation, the overall habitat through time is not substantially changed. However, some localized areas may burn severely and result in habitat altering changes. In the riparian areas of the moister forest types it is less likely that fire would carry with enough severity to appreciably alter habitat; however there is some potential for this, especially if implementation occurs during times of increased burn conditions. Species requiring more open habitats such as grasslands or savannahs could benefit from fire that reduces conifer or brush encroachment; however, invasive weeds could increase in such areas as a response to the disturbance. Habitats for sensitive plant species will undergo a mix of beneficial to detrimental effects depending upon the severity and placement of fire and the individual species ecology. With these treatments plants may be harmed upon implementation, but the general habitats that determine plant distribution would not appreciably change overall.

Roads are a direct disturbance to suitable habitats. Road segments were sorted by potential habitats for sensitive plant species, and it is assumed that for each mile of road constructed approximately 2.5 acres of habitat would be reduced over the short term. Recovery of temporary roads could be relatively rapid for early seral species, but for late seral species such as clustered lady's slipper many decades may be needed before the habitat is again suitable. System road corridors would be permanently removed from potential habitat suitability and could provide pathways of open conditions condusive to weed dispersal.

Federally Listed Species

Water howellia (*Howellia aquatilis*)

Water howellia requires very specialized aquatic habitats found in broad valley bottoms where the stagnant, ephemeral pools it inhabits occurs. The suitable habitat presented in the Existing Condition, does not occur in the project area where aquatic habitats generally more narrow,

flowing, and enclosed in the dense forests. Additionally, proposed forest activities buffer riparian and aquatic habitats. Due to lack of habitat, water howellia does not occur in the project area. For these reasons this project will have **No Effect** on water howellia.

Sensitive Plant Species

Table 2 summarizes the effects of proposed management activities on sensitive plant species habitat in the project area. Acre values are rounded to the nearest whole number. A species-specific discussion of effects is provided following the table.

Table 2. Potential Sensitive Plant Habitat Affected by Action Alternatives (acres)

Species	Activity	Proposed Action
Deerfern *Blechnum spicant*	Regeneration	0
	Commercial thin	0
	Fuels	12
	Temporary roads	0
	System road	+
Crenulate moonwort *Botrychium crenulatum*	Regeneration	0
	Commercial thin	0
	Fuels	2
	Temporary roads	0
	System road	+
Lance-leaf moonwort *Botrychium lanceolatum* var. *lanceolatum*	Regeneration	0
	Commercial thin	0
	Fuels	2
	Temporary roads	0
	System road	+
Mingan moonwort *Botrychium minganense*	Regeneration	0
	Commercial thin	0
	Fuels	2
	Temporary roads	0
	System road	+
Mountain moonwort *Botrychium montanum*	Regeneration	0
	Commercial thin	0
	Fuels	2
	Temporary roads	0
	System road	+
Northern moonwort *Botrychium pinnatum*	Regeneration	0
	Commercial thin	0
	Fuels	2
	Temporary roads	0
	System road	+
Least moonwort *Botrychium simplex*	Regeneration	0
	Commercial thin	0
	Fuels	2
	Temporary roads	0
	System road	+
Green bug-on-a-stick *Buxbaumia viridis*	Regeneration	1,447
	Commercial thin	237
	Fuels	501

	Temporary roads	35
	System road	3
Clustered lady's-slipper *Cypripedium fasciculatum*	Regeneration	310
	Commercial thin	0
	Fuels	55
	Temporary roads	7
	System road	0
Naked Rhizomnium *Rhizomnium nudum*	Regeneration	1,311
	Commercial thin	160
	Fuels	305
	Temporary roads	30
	System road	3

+ - trace

Deerfern (*Blechnum spicant*)

Fuels treatments would occur on approximately one percent of the higher potential suitable habitat for deerfern. This small amount is probably more of a GIS mapping error than actual ground disturbance since the riparian areas are generally excluded from management actions. There is some possibility that fire will creep into riparian areas, but in such an event, the effects on deerfern would be expected to be very light since the habitat would not be notable impacted. A trace of the higher potential habitat would be impacted by the new road construction. Considering the broader, lower potential habitat that includes upslope areas that provide suitable habitat, 33 percent of the potentially suitable habitat will be managed; about 25 percent of this would be subjected to even-aged management, which would have a greater likelihood of damaging or displacing plants. New roads would add an additional 30 acres of the upslope habitat potentially impacted with three acres being from the permanent road. All known occurrences of this species in the project area are excluded from management activities.

In western Washington, Deerfern has withstood harvest and related treatments (Blake and Ebrahimi 1992). However, disjunct and peripheral populations often behave differently from those populations found in optimum habitats. Idaho populations have been noted to occur where air temperatures are strikingly colder, the growing season shorter and snowfall more abundant and persistent (Cousens 1981). Disjunct inland populations are possibly more susceptible to hydrologic and solar alterations in the more marginal habitat.

Observations of Deerfern in northern Idaho suggest that disturbance may benefit some populations by creating suitable habitat for spore germination. Plants in monitored plots seem to respond favorably to disturbance and are more robust, bearing more sporophylls than plants of undisturbed habitats. This may be a short-term response and the increase in sunlight may ultimately burn the plants out, since this species naturally seems to prefer shaded moist sites (Blake and Ebrahimi 1992). After several years of monitoring, plants that were most common in riparian areas and were disturbed but not burned intensely were found to increase, however plants also increased in undisturbed control plots. Sporophyll production in open disturbed sites continued to be greater (Hammett 2001).

Thinning and timber harvest activities that do not mechanically remove existing plants and leave much of the canopy intact would not harm the population. Also the majority of Deerfern populations and best habitat occur in or near the riparian areas, which are protected by standard riparian buffers. In areas of fire implementation, riparian areas would likely burn with low intensity due to increased shade and humidity, thus the effects on this most commonly occupied habitat would be relatively light.

Crenulate moonwort (*Botrychium crenulatum*), Lance-leaf moonwort (*Botrychium lanceolatum*), Mingan moonwort (*B. minganense*), Mountain moonwort (*B. montanum*), Northern moonwort (*B. pinnatum*), Least moonwort (*B. simplex*)
The proposed actions would involve only a slight trace of potential moonwort habitat. Since such habitats are generally excluded from management, it is assumed the two acres that are involved in a burn unit are likely to be a product of GIS mapping limitation than actual disturbance on the ground. The proposed system road will cross a very small area of potential habitat.

Threats to species of Botrychium are not well understood. The only well-documented threat resulting in a population decline was drought combined with fire (Johnson-Groh and Farrar 1996). Because these species may occur in disturbed sites or edge habitats, threats may include natural plant succession and potentially the same human activities that have also apparently resulted in creation of suitable habitat. Since these species may also be found in forested areas that have not been recently disturbed, forestry activities may affect existing populations negatively, although no research has been reported (Chadde and Kudray 2001). On the Nez Perce – Clearwater National Forest, occupied habitats are usually groves of western redcedar, which are generally protected from harvest, thus no effects from that activity have been observed. Some threats that directly affect the above ground sporophyte and may be less serious, since the below ground part of the life cycle is so important.

Simple removal of above ground leaf tissue may be inconsequential to the ability of moonworts to survive, although removing sporulating individuals may eventually have an effect (Johnson-Groh 1999). It has been suggested that photosynthesis may be important and that broad scale leaf removal or damage could threaten Botrychium populations (Chadde and Kudray 2001). Mycorrhizae are the most limiting factor for Botrychium establishment, distribution and abundance (Johnson-Groh 1999). Therefore adverse actions to the mycorrhizae may be expected to also have deleterious effects on Botrychium. Timber harvest generally severs mycorrhizal relationships and increases light and temperature at the ground which may also harmful.

Low intensity ground fires would not adversely affect established populations and the fungal associates or alter the suitability of the habitat for moonworts so long as overall stand structure is maintained and the duff layer is not eliminated. The timing of the burn is also important. Research has shown populations are significantly reduced or eliminated if burning coincides with spring emergence of plants (Johnson-Groh and Farrar 1996). The direct effects of burning have been confounded by variability in burning conditions and plant numbers.

Green bug-on-a-stick (*Buxbaumia viridis*)
Under the proposed action approximately 38 percent of the potentially suitable habitat for this species would see management activities; however, even-aged management and road construction that would displace habitat would occur on approximately 25% percent of the potential habitat. Most of the better habitat, which this species has a higher affinity for would be in the protected riparian areas.

Processes, natural or man-caused, that open the overstory canopy, remove large organic debris, or disturb the soil surface could affect Buxbaumia viridis habitat. The species is rare due to inefficient dispersal and difficulties in establishment on limited, specialized substrates (Wiklund 2002). The occurrence of the required micro-habitats are limited to shaded moist forests, thus the moss would not cope well with significant effects to suitable habitat that would change the microclimate. Regeneration harvest would change the ecology of site to the point extirpation would be expected. While thinning would not significantly alter stand structure, down log recruitment, a necessary component of Buxbaumia habitat would not occur or would decline,

providing fewer opportunities for establishment. Moist riparian bottoms and toe-slopes have the greatest potential for maintaining large decaying logs within mesic forest habitats. Buffering these draws and riparian areas would protect the moist microsites where large logs and suitable habitat are most likely to occur.

The implementation of prescribed fire would have variable effects on this species and its habitat ranging from extirpation by fire that removes or significantly alters stand structure to little effect with low intensity ground fires. Most occurrences and well developed habitat for this species occurs in the moist, shaded riparian areas that would be expected to burn with less severity that may or may not adversely affect the microhabitat or alter the suitability of the habitat for Buxbaumia. In such cases fire often has little effect on the overall stand structure; canopy and large log recruitment; however, the effects will largely be determined by the burn conditions at the time of implementation.

Clustered lady's slipper (*Cypripedium fasciculatum*)
The treatments of the proposed action would occur on approximately 30 percent of the potential Cypripedium habitat. Management activities such as even-aged management and road construction that would displace the species and its habitat would occur on approximately 25 percent of potential habitat. Small occurrences are found in one fuels unit. Other occurrences exist in units set for regeneration harvest. Almost all the occurrences found in proposed harvest units are found in a single unit. Boundary adjustments and buffers will be implemented to protect the larger clusters of plants, thus ensuring viability of the species in the project area.

Clustered lady's slipper is highly sensitive to ground disturbance and canopy removal. Apparent population decreases have been observed where the overstory canopy was reduced (Lake 2002). The few plants found growing in full sunlight had yellowed and deformed leaves. Disturbance to the duff layer that results in exposed soil may also be detrimental to established populations. With even-aged management practices, the mycorrhizal fungal relationships believed to be necessary for seedling germination and health would potentially be severed or damaged. Nor would the fungus likely tolerate the direct sunlight that would result from such activities. The species has never been found in clearcut areas and extirpation would be the expected result of this form of management (Greenlee 1997).

Thinning would often maintain enough overstory canopy to sustain suitable habitat, however the skidding of logs and the construction of temporary roads would alter the soil surface and physically remove plants if present. However, plants have been found to persist after some forms of activity that avoid heavy mechanical disturbance and leaves the light, heat and moisture regimes intact. Some populations persist in areas that have undergone low intensity wildfire (Hays 1995) and in areas that underwent some form of intermediate harvest that leaves the duff layer and some cover intact (Lichthardt 2002). It is possible that intermediate harvest treatments in grand fir and Douglas fir habitat types may represent a mixture of detrimental and beneficial effects; in the short term, individuals may be harmed by the timber harvest activities or canopy reduction, but in the long term populations may benefit from the reduced threat of stand replacing fire (Greenlee 1997).

A population of clustered lady's slipper on the Nez Perce unit of the Forest was monitored for effects after prescribed fire in 1996. The results suggest that plants in the burned area produce fewer capsules than those plants found outside the burn units. It appears that due to increased exposure the plants desiccate before seed capsules mature (Vance and Lake 2001). On the Clearwater unit, Pipp (1999) observed that plants declined for two years following an intense wildfire, before disappearing completely. Harrod et al (1997) noted that fruit production was

significantly decreased in areas opened up by fire and at locations where the duff layer had been eliminated all plants were killed.

The proposed prescribed burning would occur over some of this species' potential habitat and one unit is known to contain plants. Since clustered lady's slipper blooms in May and June, spring burns could eliminate current year's seed production, shock the plant into underground dormancy or injure individual plants. Earlier burns before emergence would mitigate these negative effects. However, depending on the fuels present, slower spring burns over moister soil may actually conduct heat into the ground more than fast fall burns. Thus direct effects of fire on Cypripedium fasciculatum are complex. This should not be surprising, as fires are variable in intensity and pattern. The heat intensity and duration are dependent on numerous factors including site, depth and nature of litter, variable understory fuel levels and weather (Lichthardt 2002). The proposed prescribed fire will leave the canopy largely intact to maintain light and moisture regimes, which should maintain the species habitat into the future, while reducing the likliehood of future habitat destroying stand replacement wildfire. There is a possibility that some plants could be directly harmed by the prescribed fire, but efforts in the burn plan to mitigate such impacts should ensure the persistence of the species where it occurs in the fuels units.

Naked-stem Rhizomnium (*Rhizomnium nudum*)
Under the proposed action approximately 34 percent of the suitable habitat for this species would see management activities; however, even-aged management and road construction that would displace habitat would occur on approximately 25 percent. Most of the better habitat, which this species has a higher affinity for would be in the protected riparian areas.

Processes, natural or man-caused, that significantly open the overstory canopy, remove large organic debris, or disturb the soil surface could adversely affect *Rhizomnium nudum* habitat. Commercial thinning would not be expected to significantly alter stand structure to a point where there would be concern for this species' habitat, but mechanical harm could pose a threat. The majority of suitable habitat is likely limited to the immediate riparian area and would thus be protected from disturbance by standard riparian buffers. However, the species likely occurs on low, moist forested areas away from the draws as well.

The proposed prescribed fire would not adversely affect the microhabitat or alter the suitability of the habitat for this moss so long as the overall stand structure and canopy is maintained. However, areas that burn with more severity could lose overstory canopy and duff enough to alter the light and moisture regimes and thus harm the species or its habitat. These potential effects are largely dependent upon burn conditions at the time of implementation.

Cumulative Effects

The proposed action adds short-term disturbance to this landscape through vegetation management, prescribed fire and road construction. Past vegetation management has contributed to the reduction of some mature forest habitat required by these species. These activities along with proposed and ongoing activities would result in some localized decline in potentially suitable sensitive plant habitat for species requiring late successional habitat. Such a downward trend in habitat quality would not lead to concerns for overall population viability, since these habitats are common in much of the project area that is excluded from disturbance. Also the overall trend has been toward an increase in older forests due to decades of fire suppression. Recovery of suitable habitat in the treatment areas could vary from a few years to several decades depending upon the species and severity of the disturbance.

There are about 1,668 acres of potential clustered lady's-slipper habitat in the project area. The amount of this potential habitat existing in a suitable stage for species occupancy would have varied through time. Human caused and natural disturbances rarely if ever would have enabled all of the potentially suitable ground to be in a seral stage to be fully occupied. Due to many decades of fire suppression the current level of habitat in a suitable stage is probably higher than much of the past despite some reduction in habitat due to more recent harvests. Suitable habitat for deerfern would generally mirror that of clustered lady's-slipper, but because the preferred habitat is more centered on riparian areas it has likely been more stable through time due to reduction in fire severity in stream bottoms and general management protections of such sites. Other potentially affected sensitive plant species would see similar cumulative effects trends as they have an affinity for the same mesic forests habitats.

Some of ground to be managed will undergo intermittent treatments or fuels treatments that do not necessarily set succession back to an appreciable degree where potential rare plant habitat is concerned. Due to this fact the overall trends of habitat involved in such managment would be increasing with the continued advancement of succession, despite the potential for some short term, localized declines. Because the potentially sutiable habitats are not substantially transformed these forms of management would not be expected to have cumulative effects that would impact the continued viability of any species of concern.

All proposed and reasonably foreseeable actions on lands administered by the Forest Service could require protective measures to avoid negative effects to sensitive and rare plants. Occurrences of clustered lady's-slipper potentially impacted by management activities of this project will be protected through planning and layout to ensure viability of the speices is maintained. Therefore, there would be no adverse cumulative effects that would result in viability loss of any species of concern or would trend towards federal listing for any plant species considered as sensitive in Region 1. The protective measures applied to clustered lady's-slipper associated with occupied units in this project help to preserve the viability of the species in the project area.

Compliance with Forest Plan and Other Relevant Laws, Regulations, Policies and Plans

The project is in compliance with the laws, regulations, policies and forest plan concerning rare plant species. The ESA is not relevant because there are no federally listed plant species in the project area; however, the analysis complies with the ESA in conducting the necessary review to make that determination. The project also complies with FSM and forest plan direction to ensure that sensitive species are not moved toward federal listing, viability is maintained and the necessary biological evaluation is conducted. The necessary species-specific determinations are provided in the Effects Determinations section below.

Summary of Effects

The project will have No Effect on water howellia because this species does not occur in or have potential habitat within the project area. All the sensitive plant species that may occur in the mesic forests of the project area could see occurrences or suitable habitat affected by proposed management activities. The proposed activities May Impact individuals or habitat, but will not move any of the species in question toward federal listing or threaten the continued viability of the species in the project area. This is due to the extent of suitable habitat not involved in management activities or to mitigation measures designed to protect known occurrenences of

species from specific activities. Quantitative effects to suitable habitat for sensitive species habitat is provided above.

Effects Determinations

Determination of effects on rare plant species by management activities of this project are summarized in the table below. This table includes all plant species on the Nez Perce - Clearwater National Forest sensitive list as well as plants federally listed under the ESA, which allows this document to serve as both the biological evaluation and biological assessment for this project. There is some potential for impacts to several species as indicated based upon habitat presence and occurrence. Treatments over the large portion of the habitat would not change the local environment enough to significantly harm these species should they be present. Any of these species if present may be impacted by the proposed management activities, but due to low percentage of habitat undergoing potentially harmful treatments there would be no concerns for the overall species viability.

Table -2 Summary of Effects for Threatened and Sensitive Plant Species

Plant Species	Known Occurrence	Potential Habitat Present	Effects Determination	
			No Action	Proposed Action
Water howellia *Howellia aquatilis*	No	No	NE	NE
Macfarlane's four-o'clock *Mirabilis macfarlanei*	No	Yes	NE	NE
Spalding's catchfly *Silene spaldingii*	No	Yes	NE	NE
Maidenhair spleenwort *Asplenium trichomanes*	No	No	NI	NI
Payson's milkvetch *Astragalus paysonii*	No	No	NI	NI
Deerfern *Blechnum spicant*	No	No	NI	**MI**
Crenulate moonwort *Botrychium crenulatum*	No	No	NI	**MI**
Lance-leaf moonwort *Botrychium lanceolatum* var. *lanceolatum*	No	No	NI	**MI**
Linear-leaf moonwort *Botrychium lineare*	No	No	NI	**MI**
Mingan moonwort *Botrychium minganense*	No	No	NI	**MI**
Mountain moonwort *Botrychium montanum*	No	No	NI	**MI**
Northern moonwort *Botrychium pinnatum*	No	Yes	NI	**MI**
Least moonwort *Botrychium simplex*	Yes	Yes	NI	**MI**
Leafless bug-on-a stick *Buxbaumia aphylla* (moss)	No	No	NI	NI
Green bug-on-a-stick *Buxbaumia viridis* (moss)	No	Yes	NI	**MI**

Plant Species	Known Occurrence	Potential Habitat Present	Effects Determination	
			No Action	Proposed Action
Broadfruit mariposa *Calochortus nitidus*	Yes	Yes	NI	NI
Constance's bittercress *Cardamine constancei*	No	No	NI	NI
Buxbaum's sedge *Carex buxbaumii*	No	No	NI	NI
Bristle-stalked sedge *Carex leptalea*	No	No	NI	NI
Many headed sedge *Carex sychnocephala*	No	No	NI	NI
Anderegg's cladonia *Cladonia andereggii*	No	No	NI	NI
Pacific dogwood *Cornus nuttallii*	No	No	NI	NI
Clustered ladyslipper *Cypripedium fasciculatum*	No	Yes	NI	**MI**
Dasynotus *Dasynotus daubenmirei*	No	No	NI	NI
Idaho douglasia *Douglasia idahoensis*	No	No	NI	NI
Giant helleborine *Epipactis gigantea*	No	Yes	NI	NI
Puzzling halimolobos *Halimolobos perplexa* var. *perplexa*	No	Yes	NI	NI
Sticky goldenweed *Haplopappus hirtus* var. *sonchifolius*	No	No	NI	NI
Light hookeria *Hookeria lucens*	No	No	NI	NI
Salmon-flowered desert-parsley *Lomatium salmoniflorum*	No	No	NI	NI
Chickweed monkeyflower *Mimulus alsinoides*	No	No	NI	NI
Spacious monkeyflower *Mimulus ampliatus*	Yes	Yes	NI	NI
Thin sepal monkeyflower *Mimulus hymenophyllus*	No	No	NI	NI
Gold-back fern *Pentagramma triangularis spp. triangularis*	No	Yes	NI	NI
Sweet coltsfoot *Petasites frigidus* var. *palmatus*	No	No	NI	NI
Whitebark pine *Pinus albicaulis*	No	No	NI	NI
Licorice fern *Polypodium glycyrrhiza*	No	No	NI	NI
Naked-stem rhizomnium *Rhizomnium nudum* (moss)	No	Yes	NI	**MI**
Mendocino sphagnum *Sphagnum mendocinum* (moss)	No	No	NI	NI
Evergreen kittentail *Synthyris platycarpa*	No	No	NI	NI

Plant Species	Known Occurrence	Potential Habitat Present	Effects Determination	
			No Action	Proposed Action
Sierra wood-fern *Thelypteris nevadensis*	No	No	NI	NI
Short style toefieldia *Triantha occidentalis* ssp. *brevistyla*	No	No	NI	NI
Douglas clover *Trifolium douglasii*	No	Yes	NI	NI
Plumed clover *Trifolium plumosum* var. *amplifolium*	Yes	Yes	NI	NI
Idaho barren strawberry *Waldsteinia idahoensis*	No	No	NI	NI

Threatened Species Determination: NE = No Effect; **NLAA** = Not Likely to Adversely Affect; **LAA** = Likely to Adversely Affect.
Sensitive Species Determination: NI = No Impact; **BI** = Beneficial Impact; **MI** = May impact individuals or habitat but not likely to cause trend toward federal listing or reduce viability for the population or species; **LI** = Likely to impact individuals or habitat with the consequence that the action may contribute towards federal listing or result in reduced viability for the population or species.

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